me of more importance than the state of the metals and the electrolytic conductor in a simple voltaic circuit *before and at* the moment when metallic contact is first completed. If clearly understood, T feel no doubt it would supply us with a direct key to the laws under which the great variety of voltaic excitements, direct and incidental, occur, and open out new fields of research for our investigation.

682. We seem to have the power of deciding to a certain extent in numerous cases of chemical affinity (as of zinc with the oxygen of water, etc., etc.) which of *two modes of action of the attractive power* shall be exerted (732). In the one mode we can transfer the power onwards, and make it produce elsewhere its equivalent of action (602, 652); in the other, it is not transferred, but exerted wholly at the spot. The first is the case of volta-electric excitation, the other ordinary chemical affinity: but both are chemical actions and due to one force or principle.

683. The general circumstances of the former mode occur in all instances of voltaic currents, but may be considered as in their perfect condition, and then free from those of the second mode, in some only of the cases; as in those of plates of zinc and platina in solution of potassa, or of amalgamated zinc and platina in dilute sulphuric acid.

684. Assuming it sufficiently proved, by the preceding experiments and considerations, that the electromotive action depends, when zinc, platina, and dilute sulphuric acid are used, upon the mutual affinity of the metal zinc and the oxygen of the water (656, 659), it would appear that the metal, when alone, has not power enough, under the circumstances, to take the oxygen and expel the hydrogen from the water; for, in fact, no such action takes place. But it would also appear that it has power so far to act, by its attraction for the oxygen of the particles in contact with it, as to place the similar forces already active between these and the other particles of oxygea and the particles of hydrogen in the water, in a peculiar state of tension or polarity, and probably also at the same time to throw those of its own particles which are in contact with the water into a similar but opposed state. Whilst this state is retained, no

further change occurs; but when it is relieved, by completion
of the circuit, in which case the forces determined in opposite
directions, with respect to the zinc and the electrolyte, are
found exactly competent to neutralise each other, then a series
of decompositions and recompositions takes place amongst the
particles of oxygen and hydrogen constituting the water,,